GOSSEN METRAWATT
GMC-INSTRUMENTS GROUP

OPERATING INSTRUCTIONS

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METRALINE RCDCHECK

RCD TEST INSTRUMENT

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1 SAFETY INSTRUCTIONS

	Read and follow these instructions carefully and completely in order to ensure safe and proper use. The instructions must be made available to all persons who use the instrument. Keep for future reference.

General

- The instrument may only be used by qualified electricians in the commercial field. It is not a consumer product.
- Observe and comply with all safety regulations which are applicable for your work environment.

Accessories

- Use only the specified accessories (included in the scope of delivery or listed as options) with the instrument.
- Carefully and completely read and adhere to the product documentation for optional accessories. Retain these documents for future reference.

Handling

- Use the instrument in undamaged condition only.
  Inspect the instrument before use. Pay particular attention to damage, interrupted insulation or kinked cables. Damaged components must be replaced immediately.
- If the instrument or its accessories don't function flawlessly, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If the instrument or accessories are damaged during use, for example if they're dropped, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If there are any signs of interior damage to the instrument or accessories (e.g. loose parts in the housing), permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- The instruments and accessories of Gossen Metrawatt GmbH are designed such as to ensure optimum compatibility with the Gossen Metrawatt GmbH products that are expressly provided for them. Unless otherwise expressly confirmed in writing by Gossen Metrawatt GmbH, they are not intended and suited for use with other products.
- Route cables in an orderly fashion, e.g. the mains power cable and accessories cable. Loose, disorderly cables result in unnecessary danger of tripping and falling.

Operating Conditions

- Do not use the instrument and its accessories after long periods of storage under unfavorable conditions (e.g. humidity, dust or extreme temperature).
- Do not use the instrument and its accessories after extraordinary stressing due to transport.
- Do not expose the instrument to direct sunlight for longer periods of time. Overheating may cause damage to the instrument.
- Only use the instrument and its accessories within the limits of the specified technical data and conditions (ambient conditions, IP protection code, measuring category etc.).
- Do not use the instrument in potentially explosive atmospheres. Danger of explosion!
- Do not use the instrument in atmospheres subject to fire hazard. Danger of fire
- Implement adequate measures for protection against electrostatic discharge (ESD).

Rechargeable or Regular Batteries

- Use (rechargeable) batteries in undamaged condition only. Risk of explosion and fire in the case of damaged (rechargeable) batteries!
  Inspect the (rechargeable) batteries before use. Pay particular attention to leaky and damaged (rechargeable) batteries.
- When using (rechargeable) batteries, the respective test/measuring instrument may only be used with inserted and secured battery compartment lid. Otherwise, dangerous voltages may occur at the (rechargeable) battery contacts under certain circumstances.
- Only charge undamaged rechargeable batteries. Risk of explosion and fire in the case of damaged rechargeable batteries! Inspect the rechargeable batteries before charging. Pay particular attention to leaky and damaged rechargeable batteries.

Measurement Cables and Establishing Contact

- Plugging in the measurement cables must not necessitate any undue force.
- Never touch conductive ends (e.g. of test probes).
- Fully unroll all measurement cables before starting a test/measurement. Never perform a test/measurement with the measurement cable rolled up.
- Avoid short circuits due to incorrectly connected measurement cables.
- Ensure appropriate contacting (e.g. on the test probes, crocodile clips, Kelvin probes, etc.).
- Do not move or remove contacts (e.g. the test probes, alligator clips, Kelvin probes etc.) until testing/measurement has been completed.
  Unwanted sparking may otherwise occur due to test current.

2 APPLICATION

Please read this important information!

2.1 INTENDED USE / USE FOR INTENDED PURPOSE

The METRALINE RCDCHECK permits the testing the characteristics of RCCBs. In particular, this involves the measurement of touch voltage, breaking time and breaking current for type A, AC, and S RCCBs, as well as type F mixed frequency RCDs as of recently.

The test instrument is enclosed in a compact housing with a patented means of retaining the test probes.

The high-contrast, four-color OLED display assures excellent legibility. When performing measurements under unfavorable light conditions, measuring point illumination can be switched on.

Safety of the user, as well as that of the instrument, is only assured when it's used for its intended purpose.

2.2 USE FOR OTHER THAN INTENDED PURPOSE

Using the instrument for any purposes other than those described in the condensed operating instructions or these instrument operating instructions is contrary to use for intended purpose. Use for purposes other than those intended may result in unforeseeable damage!

2.3 LIABILITY AND GUARANTEE

The warranty provided by Gossen Metrawatt GmbH, and its liability, are governed by the applicable contractual and mandatory statutory provisions.

3 DOCUMENTATION

3.1 INFORMATION CONCERNING THESE INSTRUCTIONS

Read these instructions carefully and attentively. They contain all necessary information for safe use of the instrument. Comply with them in order to protect yourself and others from injury, and to avoid damaging the instrument.

The latest version of these instructions is available on our website:

https://www.gossenmetrawatt.de/en/services/download-center/

Errors and Suggestions for Improvement

These instructions have been prepared with utmost care in order to ensure correctness and completeness. Unfortunately, errors can never be entirely avoided. Continuous improvement is part of our quality goal, so we always appreciate your comments and suggestions.

Gender Equality

For better readability, only the masculine form is used in these instructions in a grammatically impartial sense. The feminine and diverse forms are of course always implied as well.

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3.2 IDENTIFICATION OF WARNINGS

Instructions for your safety and for the protection of the instrument and its environment are provided as warnings and notes at certain points within these instructions.

They're laid out as shown below and are graded in terms of the severity of the respective hazard. They also describe the nature and cause of the hazard, the consequences of non-observance and what must be done to avoid it.

DANGER

Death or serious injury is almost certain.

WARNING

Death or serious injury is possible.

CAUTION

Minor or moderate injury is possible.

ATTENTION

Damage to the product or the environment is possible.

Note

Important information.

Tip

Useful additional information or application tip.

3.3 IDENTIFIERS

The following identifiers are used in this documentation:

Identifier	Meaning
Control Element	Keys, buttons, menus and other controls
✓ Prerequisite	A condition etc. which must be fulfilled before a given action can be taken
▶ **Procedure**	Beginning of a procedural instruction
1. Procedural step	Steps of a procedure which must be completed in the specified order
↳ Result	Result of a procedural step | ■ Enumeration ■ Enumeration	Bullet lists
Fig. 1: Caption	Description of the content of a figure
Tab. 1: Table 1	Description of the content of a table
Footnote	Comment

Tab. 1: Identifiers in this document

3.4 SYMBOLS IN THE DOCUMENTATION

The following icons are used in this documentation:

Icon	Meaning
	Read and adhere to the product documentation.
	General warning symbol.
	Warning regarding electrical voltage.

Tab. 2: Icons used in this document

3.5 DEFINITION OF TERMS

Term	Definition
OUT	Object under test

Tab. 3: Definition of terms

4 GETTING STARTED

This chapter gives you an overview of the initial steps with the instrument.

1. Read and adhere to the product documentation. In particular, observe all safety information in the documentation, on the instrument and on the packaging.
   - Safety Instructions ➪🗎4
   - Application ➪🗎6
   - Documentation ➪🗎7
2. Familiarize yourself with the instrument ➪🗎10.
3. Familiarize yourself with the instrument's operation ➪🗎18.
4. Configure the instrument ➪🗎17.
5. Perform measurements/tests ➪🗎18.

Further topics of interest: Maintenance ➪🗎26.

5 THE INSTRUMENT

5.1 SCOPE OF DELIVERY

Please check the scope of delivery for completeness and intactness.

1	METRALINE RCDCHECK instrument with mobile test probe
4	Batteries (AAA)
1	Pouch
1	Condensed operating instructions
1	Test report

5.2 OPTIONAL ACCESSORIES

Some features necessitate optional accessories:

Charger METRALINE CHECK Series	Broad-range charger for charging optionally available batteries, e.g. Z507B. Plug adapter available for the following countries: EU, UK, US, AU
Akku-Set METRALINE CHECK Series	4 rechargeable batteries (AAA) for METRALINE ISOCHECK/ METRALINE RCDCHECK/METRALINE RCDCHECK

5.3 DEVICE OVERVIEW

5.3.1 FRONT

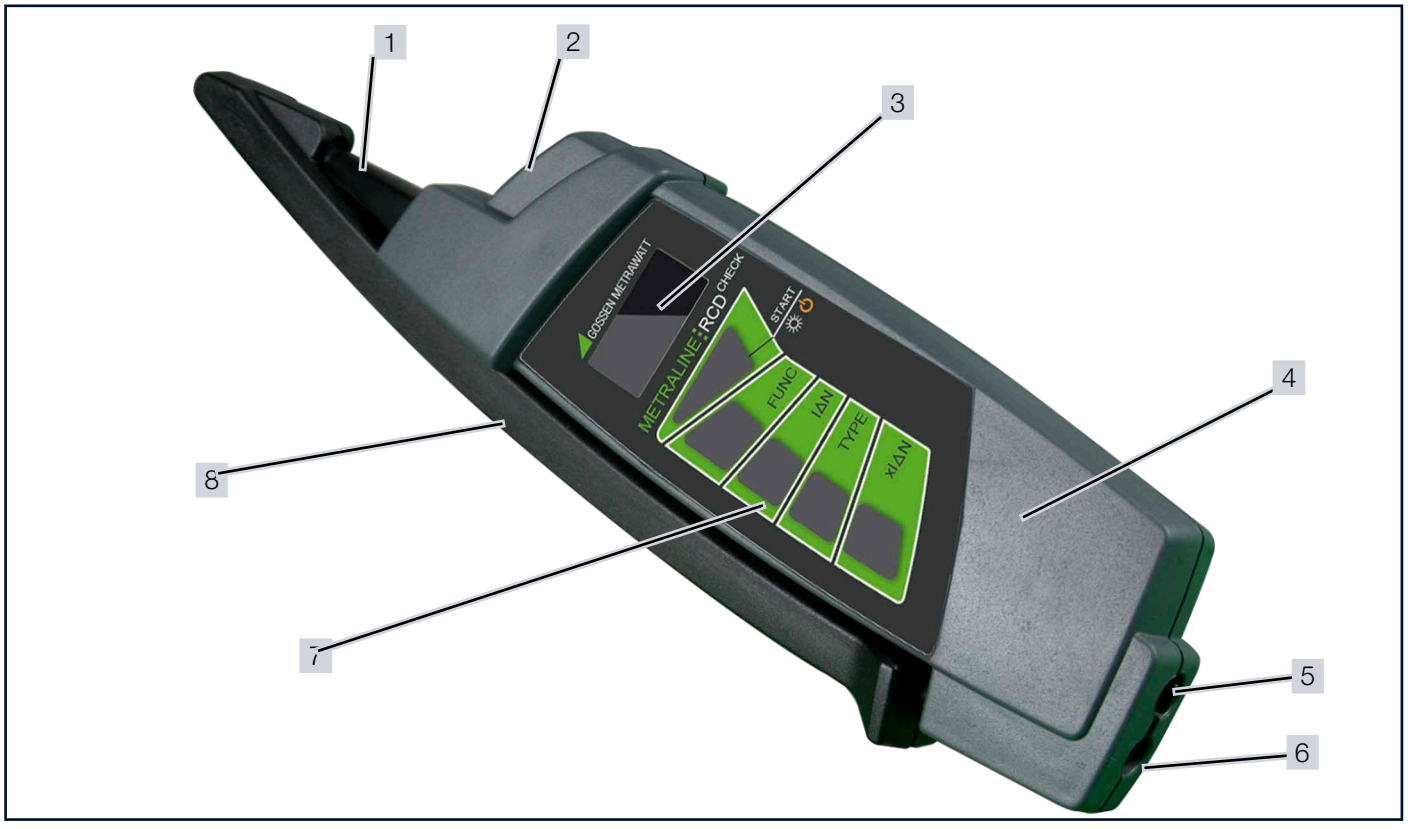


Fig. 1: Front panel

1	Fixed test probe attached to the device	5	Socket for charger
2	LED	6	Socket for flexible test probe
3	Display	7	Control panel
4	Plastic housing	8	Plug-in mobile test probe

5.3.2 BACK



Fig. 2: Back of instrument, detail view of the back panel with battery compartment lid

1	Battery/fuse compartment lid	3	Serial plate
2	Screws for battery compartment lid		

5.3.3 CONTROL PANEL

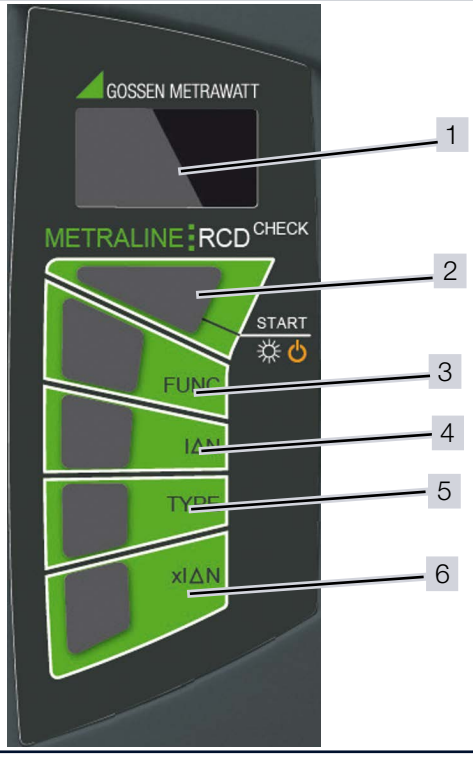


Fig. 3: Control panel

1	Graphic OLED display	4	$I_{\Delta N}$ key
2	START key	5	TYPE key
3	FUNC key	6	$xI_{\Delta N}$ key

5.4 KEYS AND FUNCTIONS

Key	Description	Action	Function
	**START**	Press and hold until the display lights up	Switches on the instrument
		Press and hold until the measurement starts	Starts the measurement If voltage is applied to the test probes: briefly pressing starts measurement (exception for U_C: is displayed immediately after voltage is applied)
		Press briefly	If no voltage is applied to the test probes: switches illumination on or off
		Press twice briefly	Switches the instrument off
	**FUNC**	Press	Selects the desired measurement function: **U_C, TIME, I◢**
	**$I_{\Delta N}$**	Press	Selects nominal differential current
	**TYPE**	Press	Selects RCD type and differential current shape: **U_C** function: RCD Type selection **TIME** function: Selection of waveform and initial polarity of the residual current, as well as RCD type **I◢** function: Selection of waveform and initial polarity of the residual current
	**$xI_{\Delta N}$**	Press	Selects multiplier of nominal differential current or limit contact voltage: **U_C** function: Selection of the touch voltage limit value **TIME** function: selection of a multiplier for nominal residual current

Tab. 4: Keys and functions

5.4.1 SYMBOLS ON THE INSTRUMENT AND THE INCLUDED ACCESSORIES

Icon	Meaning
	Warning concerning a point of danger (attention, observe documentation!)
	Double insulation (protection category II)
	European conformity marking
	The instrument may not be disposed of with household trash ⇨ "Disposal and Environmental Protection" 🗎31.
	Warning regarding dangerous electrical voltage

Tab. 5: Symbols on the Instrument and the included accessories

5.5 FEATURES

- RCD disconnecting time
- RCD breaking current
- Loop impedance without tripping the RCD
- Phase detection
- Testing of RCCBs
- Measurement of touch voltage without tripping
- Tripping test with nominal residual current

5.6 RELEVANT STANDARDS

The instrument has been manufactured and tested in accordance with the following safety regulations:

DIN EN IEC 61557-1	Electrical safety in low voltage distribution systems up to 1000 V AC and 1500 V DC - Equipment for testing, measuring or monitoring of protective measures – Part 1: General requirements
DIN EN IEC 61557-6	Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. - Equipment for testing, measuring or monitoring of protective measures – Part 6: Effectiveness of residual current devices (RCD) in TT, TN and IT systems (IEC 61557-6:2019)
DIN EN 61010-1 IEC 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements
DIN EN 61010-2-031 IEC 61010-2-031	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test
DIN EN 61326-1 IEC 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
DIN EN 55022	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement (CISPR 22:2008, modified)
DIN EN 61000-4-2 IEC 61000-4-2	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
DIN EN 61000-4-3 IEC 61000-4-3	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
DIN EN 61000-4-4 IEC 61000-4-4	Electromagnetic compatibility (EMC) – Part 4-4:Testing and measurement techniques – Electrical fast transient/burst immunity test
DIN EN 61000-4-5 IEC 61000-4-5	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test
DIN EN 61000-4-6 IEC 61000-4-6	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields

Tab. 6: Relevant standards

5.7 TECHNICAL DATA

Power Supply	Batteries	4 ea. AAA (LR03), 1.5 V alkaline or 1.2 V NIMH (with at least 750 mAh)
	Number of measurements	with batteries at 800 mAh: approx. 3000 measurements
Ambient Conditions	Operating temperatures:	+0 °C … +40 °C / +32 °F … +104 °F
	Storage temperatures:	–10 °C … +70 °C / +14 °F … +158 °F
	Relative atmospheric humidity, operation:	max. 85%, no condensation allowed
	Relative atmospheric humidity, storage:	max. 90% at –10 °C … +40 °C / +14 °F … +104 °F max. 80% at +40 °C … +70 °C / +104 °F … +158 °F
	Mains voltage	190 V … 255 V / 45 Hz … 65 Hz
	Elevation:	max. 2000 m / 6562 ft.
Reference Conditions	Temperature	23 ± 2 °C
	Relative humidity	40% … 60%
	Mains voltage	230 V ± 2 % / 50 Hz ± 1 %
Electrical Safety	Measuring category:	with safety cap on the test probe: CAT III 300 V without safety cap on the test probe: CAT II 300 V
	Pollution degree:	2
	Protection category:	II
	Fuse	SIBA ceramic fuse 6.3 mm × 32 mm, F500 mAL/250 V
Electromagnetic Compatibility (EMC)	Interference emission:	EN 55022, class B
	Interference immunity:	DIN EN 61326-1 / IEC 61326-1 EN 61000-4-2 / 3 / 4 / 5 / 6
Mechanical Design	Protection:	Housing: IP40 per DIN EN 60529 / IEC 60529 (Protection against ingress of solid foreign objects: ≥ 1.0 mm ∅ / 0.039"; protection against ingress of water: not protected)
	Housing (W × H × D):	Approx. 255 mm × 70 mm × 40 mm / 10" × 2.8" × 1.6"
	Weight:	Approx. 0.36 kg / 0.79 lb (including batteries)
	Display:	OLED, multicolored, backlit

Tab. 7: Technical data

5.8 CHARACTERISTIC VALUES

Residual Current Devices (RCD) – General Specifications[a)b)]

Nom. residual current	10 mA, 30 mA, 100 mA, 300 mA, 500 mA
Deviation from nominal residual current	(–0 / +0.1) I_Δ; I_Δ= $I_{\Delta N}$, 2x $I_{\Delta N}$, 5x $I_{\Delta N}$
Waveform of nominal residual current	Sinusoidal (AC), pulsating DC (A)
RCD type	Standard and selective S
Initial polarity of residual current	0° or 180°
Voltage range	190 V … 255 V / 45 Hz … 65 Hz

Residual Current Generated by the Tester (TRMS value at 20 ms):

	½ $I_{\Delta N}$		$I_{\Delta N}$		2 x $I_{\Delta N}$		5 x $I_{\Delta N}$		I ◢	
$I_{\Delta N}$ (mA)	AC	A	AC	A	AC	A	AC	A	AC	A
10	5	3.5	10	20	20	40	50	100	×	×
30	15	10.5	30	42	60	84	150	212	×	×
100	50	35	100	141	200	282	500	—	×	×
300	150	105	300	424	—	—	—	—	×	×
500	250	175	500	—	—	—	—	—	×	—

Touch Voltage Uc and Uci[a)b)]

Nominal range per DIN EN IEC 61557-6: 3.0 V … 49.0 V for a touch voltage limit value of 25 V

Nominal range per DIN EN IEC 61557-6: 3.0 V … 99.0 V for a touch voltage limit value of 50 V

Measuring Range	Resolution	Intrinsic Uncertainty	Measuring Uncertainty
0.0 V … 9.9 V	0.1 V	–0 / +10 % of reading + 2 digit	–0 / +10 % of reading + 3 digit
10.0 V … 99.9 V		–0 / +10 % of reading	–0 / +10 % of reading + 1 digit

Impedance of Fault Loop[a)b)]

Nominal Range per DIN EN IEC 61557-3 – 27 Ω to 2000 Ω

Measuring Range	Resolution	Intrinsic Uncertainty	Measuring Uncertainty
0 Ω … 2000 Ω	1 Ω	5 % of reading + 3 digit + 0.05V/$I_{\Delta N}$	5 % of reading + 5 digit + 0.05V/$I_{\Delta N}$

Measuring current: ≤ ½ $I_{\Delta N}$

The results of the fault loop impedance measurement appear at the display, if nominal residual is set to $I_{\Delta N}$ ≥ 30 mA.

Time to Trip – TIME[a)b)]

Standard Residual Current Circuit Breaker (range per DIN EN IEC 61557-6):

Measuring Range	Resolution	Intrinsic Uncertainty	Measuring Uncertainty
0 ms … 300 ms (½$I_{\Delta N}$, $I_{\Delta N}$)	1 ms	±3 ms	±4 ms
0 ms … 150 ms (2 × $I_{\Delta N}$)			
0 ms … 40 ms (5 × $I_{\Delta N}$)			

Selective Residual Current Circuit Breaker (range per DIN EN IEC 61557-6):

Measuring Range	Resolution	Intrinsic Uncertainty	Measuring Uncertainty
0 ms … 500 ms (½$I_{\Delta N}$, $I_{\Delta N}$)	1 ms	±3 ms	±4 ms
0 ms … 200 ms (2 × $I_{\Delta N}$)			
0 ms … 150 ms (5 × $I_{\Delta N}$)			

Tripping Current I ◢ (range per EN 61557-6)[a)b)]

Measuring Range for I_Δ	Resolution	Intrinsic Uncertainty	Measuring Uncertainty
0.4 … 1.1 $I_{\Delta N}$ (type AC)	0.1 mA	±0.08 $I_{\Delta N}$	±0.1 $I_{\Delta N}$
0.4 … 1.5 $I_{\Delta N}$ (type A)			

Alternating Voltage (frequency range: 45 to 65 Hz)[a)b)]

Measuring Range	Resolution	Intrinsic Uncertainty	Measuring Uncertainty
190 V … 255 V	0.1 V	±2 % of reading + 2 digit	±3 % of reading + 3 digit

a) In the case of alternating quantities, the TRMS voltage value is measured.
b) The measuring uncertainties specified here are only valid if line voltage is stable during measurement, the earthing system is free of interference voltage, there are no influences caused by potential from neighboring systems and no leakage current flows through the measured electrical circuit.

6 START UP

Unpacking and battery insertion are described in the short form operations. For battery replacement see ⇨ "Device Power Supply" 🗎26.

6.1 SWITCHING ON/OFF

6.1.1 SWITCHING ON THE INSTRUMENT

1. Press and hold **START**.

↳ The display lights up. The instrument is ready for operation.

Note

If no key is pressed and no voltage is applied to the test probes, the instrument reacts als follows:

- Power saving mode: After 30 seconds of inactivity the display brightness is reduced. Pressing any key or applying voltage to the test probes, the display turns back to full brightness.
- Auto power off: After 1 minute of inactivity, the instrument switches off automatically.

6.1.2 SWITCHING OFF THE INSTRUMENT

✓ No voltage is applied to the test probes.

1. Press **START** twice briefly.

↳ The instrument is switched off.

7 OPERATION

7.1 DATA PRESENTATION

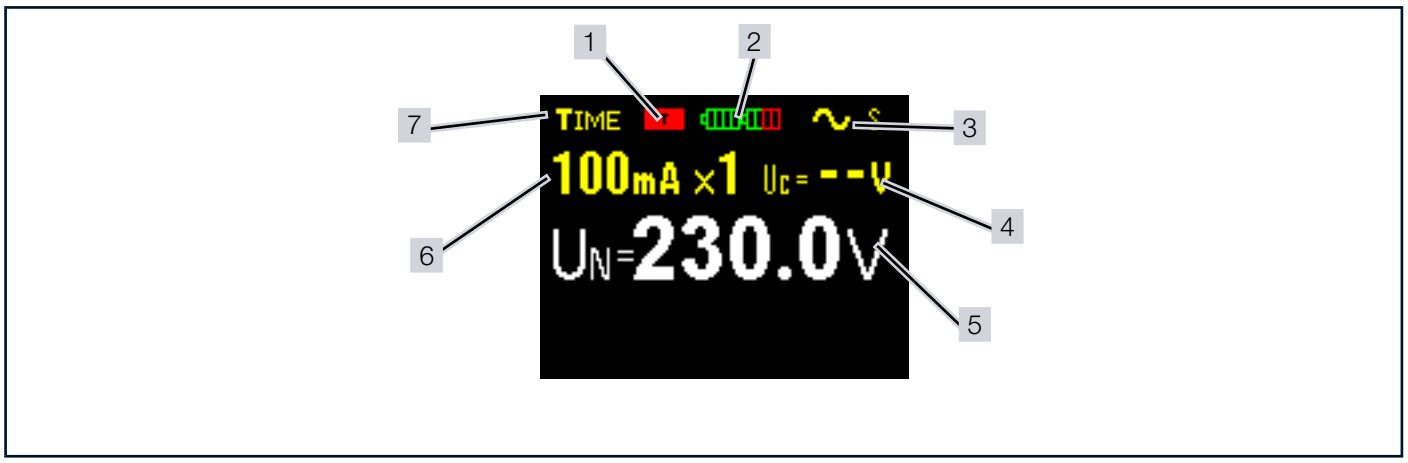


Fig. 4: Example of displayed information

1	Overheating indicator	5	Main measured value
2	Battery indicator	6	Nominal differential current and its multiplier
3	RCD type, diff. current shape	7	Measured function
4	Secondary measured value		

7.2 INSTRUCTIONS AN PRINCIPLES FOR ALL MEASUREMENTS

- The desired functions or parameters are selected with the **FUNC**, $I_{\Delta N}$, **TYPE** and $xI_{\Delta N}$ keys. Measurement is started by pressing the **START** key. All selected functions or parameters remain valid until they are changed.
- If the (interference) voltage of less than 190 V or greater than 255 V is applied to the test probes, corresponding information appears on the display. If this is the case, the **START** key is disabled.
- Before a measurement, check that there is no interference voltage present. To do so, contact the OUT with the test probe and start the measuremnet with the **START** key. If there is intereference voltage present, it will appear on the display.



Fig. 5: Display of (interference) voltage < 190 V



Fig. 6: Display of (interference) voltage > 255 V

- If line voltage is applied to the test probes, and if the fuse is either blown or has not been inserted, this is indicated on the display.The fuse must be replaced; ⇨ "Fuse Replacement" 🗎27.

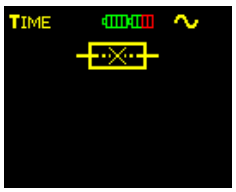


Fig. 7: Blown fuse display

Note

If a voltage within a range of 25 V to 190 V is applied to the test probes, the blown fuse symbol is also displayed at the instrument even if the fuse is OK. For this reason, make sure that voltage in the measured electrical circuit is really more than 190 V before replacing the fuse.

- If the display shown below appears after pressing the **START** key, the RCD has been tripped during touch voltage measurement. This can be caused by an incorrectly adjusted nominal current value $I_{\Delta N}$, by a defective RCD or by previously existing leakage current via the RCD. This status is displayed until one of the function selection keys is pressed, or the device is once again connected to mains power.

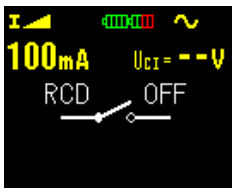


Fig. 8: Example of display for tripping during touch voltage measurement

- If battery voltage is too low (only the red field is lit up in the battery symbol), measurement cannot be triggered with the **START** key. If the key is nevertheless pressed, the depleted battery symbol is displayed for about 1 second. The instrument is then returned to its previous status. Replace the batteries or recharge them.



Fig. 9: Battery voltage too low



Fig. 10: Battery status after pressing the **START** *key*

- If several measurements with high $I_{\Delta N}$ values are performed one after the other, the red field indicates internal warming of the instrument. As temperature increases, the red field is gradually filled in and becomes wider. An inversely displayed **STOP** symbol appears when the maximum permissible temperature is exceeded. If the **START** key is pressed, the overheating symbol appears for about 1 second and further measurements are disabled. The instrument is then returned to its previous status which prevailed before the **START** key was pressed. Allow the test instrument to cool down, which is indicated by the shrinking temperature display.



Fig. 11: STOP: *Indication of overheating*



Fig. 12: Indication of overheating after pressing the **START** *key*

7.3 PERFORMING THE MEASUREMENT

1. Securely contact the object under test with the test probes.
2. Press the **START** key.
   ↳ The measurement starts.
3. Check to see whether or not the displayed line voltage value is stable. Do not remove the test probes from the object under test during measurement. Measurement results might otherwise be distorted.

Influences on Measurement Results

- Current flowing via PE has an unfavorable influence on measurement results, or makes measurement entirely impossible, due to, for example, consuming devices or capacitance between L and PE. Consuming devices of this sort should therefore be removed prior to measurement.
- Measurement results can be influenced by several factors:
  - Leakage current in the measured electrical circuit
  - Interference voltage occurring in an earthing system
  - When the earthing system is influenced by the potential of another earthing system
  - Fluctuating line voltage
- If the icon **TEST** appears together with the measurement results, the measurement results for the respective function lie within the specified limit values.

7.4 ADJUSTABLE PARAMETERS

The **limit value for touch voltage U_{Cmax}** can be set to either 50 V or 25 V. Adjust with the **x$I_{\Delta N}$** key when the touch voltage measurement function (U_C) has been activated with the **FUNC** key.

The **nominal value for residual current** can be set to one of the following values with the **$I_{\Delta N}$** key: 10 mA, 30 mA, 100 mA, 300 mA or 500 mA.

The **residual current multiplier** can be set to a value of ½, 1, 2 or 5 for 10, 30 and 100 mA, or to ½ or 1 for 300 and 500 mA with the **x$I_{\Delta N}$** key, after the **TIME** function has been activated with the **FUNC** key.

RCD type: Residual current waveform and polarity are selected with the **TYPE** key.

Display Symbol	RCD Type (residual current waveform)	Initial Polarity of the Residual Current
⏦	AC (sinusoidal)	Positive half-wave
⏦		Negative half-wave
⏦	A (pulsed)	Positive half-wave
⏦		Negative half-wave

Display Symbol	RCD Type	RCD Type
■	AC or A	Standard
S		Selective

Refer to the technical data for further details.

7.5 MEASURING THE INDIVIDUAL PARAMETERS OF AN RCD

- If a voltage within a range of 190 to 255 V is applied to the test probes, the TRMS value appears on the display and measurement can be triggered by pressing the **START** key.

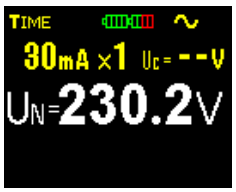


Fig. 13: Example of a voltage measurement

- For safety reasons, the test instrument first determines whether or not touch voltage U_C is higher than the selected limit value each time the **START** key is pressed before measuring RCD parameters. If the limit value is exceeded, this is indicated on the display and the measurement is ended.

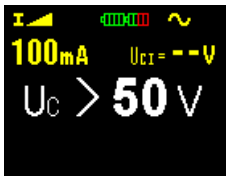


Fig. 14: Touch voltage > 50 V

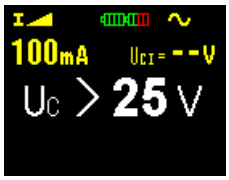


Fig. 15: Touch voltage > 25 V

7.5.1 TOUCH VOLTAGE UC

The displayed touch voltage refers to nominal residual current. For safety reasons, it is multiplied by the following coefficients:

RCD type	Contact voltage is proportional to:
~ ▬ ~ ▬	1,05 × $I_{\Delta N}$
~ S ~ S	1,05 × 2 × $I_{\Delta N}$
⌒ ▬ ⌒ ▬	1,05 × $\sqrt{2}$ × $I_{\Delta N}$
⌒ S ⌒ S	1,05 × 2 x $\sqrt{2}$ × $I_{\Delta N}$

1. Select the **U_C** function with the **FUNC** key.
   - The nominal value for residual current can be set with the **$I_{\Delta N}$** key.
   - RCD type is selected with the **TYPE** key.
   - The limit value for touch voltage **U_C** is adjusted with the **x$I_{\Delta N}$** key.



Fig. 16: Example: Settings for touch voltage measurement

2. Connect the instrument to L and PE downstream from the RCD as shown below. Example:

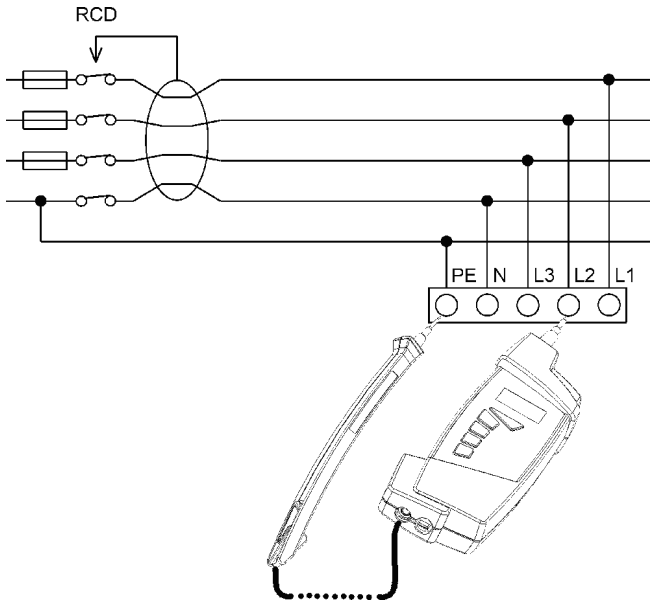


Fig. 17: Connection example

3. After voltage value U_{L-PE} settles in, briefly press the **START** key to trigger the measurement.

↳ After the measurement has been completed, the results are displayed as follows:

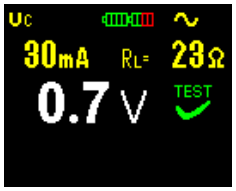


Fig. 18: Results of a touch voltage measurement

↳ RL … fault loop impedance; $R_L = U_C^*/ I_{\Delta N}$, where U_C^* is actually measured touch voltage, i.e. without a safety coefficient from the table at the beginning of this section.

Note

The value for fault loop impedance appears on the display if residual current $I_{\Delta N}$ is set to ≥30 mA.

4. Remove the test instrument from the RCD under test.

7.5.2 TIME TO TRIP

The following table shows time to trip in accordance with the EN 61008, EN 61009 and IEC 60364-4-41 standards:

	½ $I_{\Delta N}$ *	$I_{\Delta N}$	2 $I_{\Delta N}$	5 $I_{\Delta N}$	Comment
Standard	—	300 ms	150 ms	40 ms	max. permissible tripping current
Selective	—	500 ms	200 ms	150 ms	
	—	130 ms	60 ms	50 ms	min. permissible tripping current

*An RCD may not trip at ½ $I_{\Delta N}$.

1. Select the **TIME** function by pressing the **FUNC** key.
   - The nominal value for residual current can be set with the $I_{\Delta N}$ key.
   - RCD type is selected with the **TYPE** key.
2. Select a multiplier with the help of the $xI_{\Delta N}$ key.



Fig. 19: Example: Settings for time to trip measurement

3. Connect the instrument to L and PE downstream from the RCD.
4. After voltage value U_{L-PE} settles in, briefly press the **START** key to trigger the measurement.

↳ After the measurement has been completed, the results are displayed as follows:

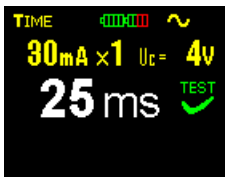


Fig. 20: Results of the time to trip measurement

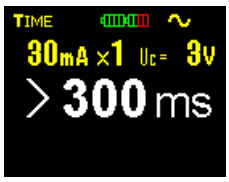


Fig. 21: Results when the RCD is not tripped

U_C (touch voltage) … touch voltage value

5. Remove the test instrument from the RCD under test.

- Selective RCDs include a delay element which makes it necessary to wait for a certain amount of time after each measurement until the RCD is returned to its initial state. A 30 second pause is therefore specified for the measurement of selective RCDs, the progress of which appears on the display in the form of a countdown timer which runs from 30 seconds to 1 second:



Fig. 22: Example: Waiting time for measuring selective RCDs

7.5.3 TRIPPING CURRENT I ◢

1. Select the I◢ function by pressing the **FUNC** key.
   - Set residual current with the $I_{\Delta N}$ key.
   - RCD type is selected with the **TYPE** key.



Fig. 23: Settings for the tripping current measurement

2. Connect the instrument to L and PE downstream from the RCD.
3. After voltage value $U_{L\text{-}PE}$ settles in, briefly press the **START** key to start the measurement.
   ↳ After the measurement has been completed, the results are displayed as follows:

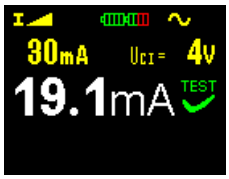


Fig. 24: Tripping current measurement results

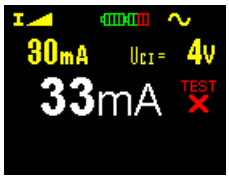


Fig. 25: Example: RCD is not tripped

U_C (touch voltage) … touch voltage value

4. Remove the test instrument from the RCD under test.

7.6 PHASE DETECTION

If the symbol **X** appears in the lower right-hand corner of the display, and if a phase is contacted with the fixed test probe, the symbol is changed to **L**.

The other test probe may not be connected anywhere or make any contact at all!



Fig. 26: No phase voltage



Fig. 27: Phase voltage

Note

Phase voltage to earth must be ≥190 V at 45 Hz to 65 Hz – displayed results are otherwise not reliable.

7.7 MEASURING POINT ILLUMINATION WITH WHITE LED

1. Briefly press the **START** key.

↳ The LED is switched on or off.

Note

✓ The instrument must not contact anything.

✓ The test probes are not connected (no voltage applied).

7.8 QUERY FIRMWARE VERSION

Before querying the firmware version, disconnect both test probes from the object under test / measuring circuit and switch the test instrument off.

1. Press and hold the **FUNC** key while switching the test instrument on.
   ↳ The firmware version and other service information appears on the display.
2. Release the **FUNC** key.
   ↳ The instrument is switched back to normal operation.

7.9 DISPLAY THE SERIAL NUMBER OF THE DEVICE

Before displaying the serial number of the device, disconnect both test probes from the object under test / measuring circuit and switch the test instrument off.

1. Hold down the $I_{\Delta N}$ key and turn on the instrument.

↳ The display shows the date the firmware was loaded to the instrument (in MM.YYYY format) and the serial number of the instrument as long as the $I_{\Delta N}$ key is pressed. Additional information (if available) may also be displayed.

7.10 DEVICE RESET FUNCTION

If the test instrument does not function as described in these instructions, we recommend a device reset. The test instrument must be switched off and neither of the test probes may be connected to an OUT. If device functions are still incorrect after switching the instrument back on again, remove the batteries, wait at least 10 seconds and then reinsert the batteries (or replace them with new ones).

If the test instrument still does not function as described, remove the batteries and contact our service department.

8 STORAGE AND TRANSPORT

ATTENTION

Improper storage

Damage to the product and measuring error due to environmental influences

- Store the instrument in a protected location and only within the limits of permissible ambient conditions. The ambient conditions (temperature, humidity etc.) can be found in chapter ⇨ "Technical Data" 🗎14.

ATTENTION

Improper transport

Damage to the product and measuring error

- Transport the instrument only within the limits of permissible ambient conditions (temperature, humidity etc.) ⇨ "Technical Data" 🗎14.
- Only use the included pouch to transport the instrument.

9 MAINTENANCE

9.1 DEVICE POWER SUPPLY

CAUTION

Dangerous voltage in battery compartment!

Disconnect the test probes from the device under test and switch the instrument off before removing the battery compartment lid.

The device can be used with batteries or rechargeable batteries; ⇨ "Technical Data" 🗎14.

The battery charge level is continuously displayed.

If too little voltage is indicated, replace the batteries.

ATTENTION

Battery leakage!

Leaking batteries will cause damage to the device.

Remove the batteries for longterm storage.

9.1.1 INSERTING AND REPLACING THE BATTERIES

1. Disconnect the test probes from the device under test and switch the instrument off before removing the battery compartment lid.
2. Switch off the instrument.
3. Loosen the two screws for the battery compartment lid at the back of the instrument and remove the lid.
4. Insert the batteries with correct polarity (refer to the embossed symbols at the bottom of the battery compartment). Always replace all four batteries at once.



Fig. 28: Correct battery polarity

5. Replace the battery compartment lid and retighten the screws.

9.1.2 RECHARGING THE BATTERIES

ATTENTION

Damage to the device!

Use only the charger (Z507A) which is offered as an optional accessory for this instrument to charge the batteries inserted in the instrument.

✓ Rechargeable batteries have been inserted with correct polarity.
✓ The instrument has been disconnected from the measuring circuit at all poles.
✓ The instrument is turned off.

1. Connect the charger to the charging socket of the device.
2. Connect the charger to the mains.

↳ Recharging of the batteries starts. The charging process is indicated by the red light of the LED, on the front of the device.
Charging takes approximately 5 hours and 30 minutes (integrated safety timer) if the batteries have been fully depleted.

9.2 FUSE REPLACEMENT

ATTENTION

Unsuitable fuse

If any fuse other than the one specified is inserted into the instrument, this may result in damage to the instrument and/or danger for the user.

- Replace the fuse only with the fuse type specified in section ⇨ "Technical Data" 🗎14.

1. Loosen the two screws for the battery compartment lid and remove the lid.
2. Remove the blown fuse from the fuse holder.
3. Replace the fuse with a new one.
4. Replace the lid and retighten the screws.
5. Check the instrument for correct functioning.

9.3 CLEANING



DANGER

Life endangering due to electric shock!

The instrument and its accessories are operated with electrical power, therefore there is a general risk of electric shock. This can be fatal or cause serious injuries.

- The instrument, the accessories and all connected conductors must be voltage-free before and during cleaning. Switch the test instrument off and disconnect it from the mains power supply.
- Never immerse the instrument/accessories in water or other fluids.
- Never touch the instrument/accessories with wet or moist hands.

ATTENTION

Unsuitable cleaning agents

Unsuitable cleaning agents such as aggressive or abrasive cleansers result in damage to the instrument/ accessories.

- Use a soft cloth which has been slightly dampened with water for cleaning.
- Avoid the use of cleansers, abrasives or solvents.

- Keep the outside surfaces of the instrument and any accessories clean.
- Do not place the test instrument back into service until its surface is completely dry.

9.4 RECALIBRATION

Calibration capability is valid for 3 years in Germany. Recalibration by our state-approved test laboratory is possible at any time. Contact information ⇨ "Contact, Support and Service" 🗎29.

10 REPAIR

If your instrument requires repair, please contact our service department ⇨ "Contact, Support and Service" 🗎29.

Note

Loss of warranty and guarantee claims

Unauthorized modification of the instrument is prohibited. This also includes opening the instrument.

If it can be ascertained that the instrument has been opened by unauthorized personnel, no guarantee claims can be honored by the manufacturer with regard to personal safety, measuring accuracy, compliance with applicable safety measures or any consequential damages.

If the guarantee seal is damaged or removed, all guarantee claims are rendered null and void.

- The device may only be repaired or opened by authorized, qualified personnel who are familiar with the associated dangers.
- Original replacement parts may only be installed by authorized, qualified personnel.

11 CONTACT, SUPPORT AND SERVICE

Gossen Metrawatt GmbH can be reached directly and simply – we have a single number for everything! Whether you require support or training, or have an individual inquiry, we can answer all of your questions here:

+49-911-8602-0	Monday to Thursday:	8 a.m. to 4 p.m.
	Friday:	8 a.m. to 2 p.m.
Or contact us by e-mail at:	info@gossenmetrawatt.com	

Do you prefer support by e-mail?

Measuring and Test Technology:	support@gossenmetrawatt.com
Industrial Measuring Technology:	support.industrie@gossenmetrawatt.com

Enquiries concerning training and seminars can also be submitted by e-mail and online:

training@gossenmetrawatt.com

https://www.gossenmetrawatt.com/training

Please contact GMC-I Service GmbH for repairs, replacement parts and calibration[1]:

+49-911-817718-0

service@gossenmetrawatt.com

https://www.gmci-service.com/en/

Beuthener Str. 41
90471 Nürnberg
Germany

1. DAkkS calibration laboratory per DIN EN ISO/IEC 17025
accredited by the Deutsche Akkreditierungsstelle GmbH under reference number D-K-15080-01-01.

12 CERTIFICATIONS

12.1 CE DECLARATION

The instrument fulfills all requirements of applicable EU directives and national regulations. We confirm this with the CE mark. The CE declaration is available upon request.

12.2 TEST REPORT

A test report is included with the instrument.

13 DISPOSAL AND ENVIRONMENTAL PROTECTION

Proper disposal makes an important contribution to the protection of our environment and the conservation of natural resources.

ATTENTION

Environmental damage

Improper disposal results in environmental damage.

- Follow the instructions concerning return and disposal included in this section.

13.1 DISPOSAL OF OLD DEVICES, BATTERIES AND RECHARGEABLE BATTERIES

Old devices and (rechargeable) batteries contain valuable raw materials that can be recycled, as well as hazardous substances which can cause serious harm to human health and the environment, and they must be recycled and disposed of correctly.



The symbol depicting a crossed-out garbage can on wheels refers to the legal obligation of the owner or end-user not to dispose of old devices and batteries or rechargeable batteries with unsorted municipal waste ("household trash"). The (rechargeable) batteries must be removed from the old device (where possible) without destroying them and the old device and the (rechargeable) batteries must be disposed of separately. The type and chemical composition of the (rechargeable) battery are indicated on the battery's labelling. If the abbreviations "Pb" for lead, "Cd" for cadmium or "Hg" for mercury are included, the (rechargeable) battery exceeds the limit value for the respective metal.

You are obliged to comply with respective local requirements and implement them correctly on site. Further information can be obtained, for example, from the responsible authorities or the local distributor.

Please also observe the owner's or end user's responsibility with regard to deleting personal data, as well as any other sensitive data, from old devices before disposal.

13.2 DISPOSAL OF PACKAGING MATERIALS

Packaging and its parts must be correctly disposed of separately from unsorted municipal waste ("household trash").

You are obliged to comply with respective local requirements and implement them correctly on site. Further information can be obtained, for example, from the responsible authorities or the local distributor.

We recommend retaining the original packaging materials in case you might require servicing or calibration in the future.



WARNING

Danger of asphyxiation resulting from foils and other packaging materials

Children and other vulnerable persons may suffocate if they wrap themselves in packaging materials, or their components or foils, or if they pull them over their heads or swallow them.

- Keep packaging materials, as well as their components and foils, out of the reach of babies, children and other vulnerable persons.

13.3 REGULATIONS FOR THE FEDERAL REPUBLIC OF GERMANY

The following comments refer specifically to the legal situation in the Federal Republic of Germany.

Old devices, electrical or electronic accessories and batteries or rechargeable batteries

Old devices, electrical or electronic accessories, batteries and rechargeable batteries used in Germany can be returned free of charge to Gossen Metrawatt GmbH or the service provider responsible for their disposal in compliance with applicable regulations, in particular laws concerning packaging and hazardous goods. Batteries and rechargeable batteries must be returned in the discharged state or with appropriate precautions against short circuiting. Further information regarding returns can be found on our website.

Packaging Materials

Packaging which is not subject to so-called system participation is returned to the appointed service provider. Further information regarding returns can be found on our website.

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